

WHAT IS CLAIMED IS:

1 1. A method for facilitating cell searches in a
2 cellular communications system, comprising the steps of:

3 a base station generating an identifying code set for
4 transmission, said identifying code set comprising a
5 plurality of code words including a plurality of symbols from
6 a set of short codes, each code word of said plurality of
7 code words defined such that no symbol-wise cyclic shift of
8 said each code word produces a valid code word; and

9 said base station transmitting said generated
10 identifying code.

11 2. The method of Claim 1, wherein said plurality of
12 code words comprises a plurality of Q-ary code words, and
13 said set of short codes comprises a set of Q short codes.

14 3. The method of Claim 2, wherein said plurality of
15 Q-ary code words comprises a plurality of length M Q-ary code
16 words.

1 4. The method of Claim 1, wherein said identifying
2 code is formed by concatenating an inner and outer code.

3 5. The method of Claim 4, wherein said inner code
4 comprises a tailbiting trellis code.

5 6. The method of Claim 4, wherein said outer code
6 comprises a binary code.

7 7. The method of Claim 5, wherein said tailbiting
8 trellis code comprises an orthogonal trellis code.

9 8. The method of Claim 5, wherein said tailbiting
10 trellis code comprises a superorthogonal trellis code.

1 9. A method for a mobile station to decode an
2 identifying code transmitted from a base station in a CDMA
3 cellular communications system, comprising the steps of:

4 receiving a plurality of consecutive symbols comprising
5 said identifying code;

6 determining whether said received plurality of
7 consecutive symbols comprises a valid code word; and

8 if said received plurality of consecutive symbols does
9 not comprise a valid code word, cyclically shifting said
10 received plurality of consecutive symbols by a predetermined
11 amount, and returning to the determining step;

12 if said received plurality of consecutive symbols
13 comprises a valid code word, outputting a number of cyclical
14 shifts made to obtain said valid code word and a message
15 associated with said valid code word.

16 10. The method of Claim 9, wherein said number of
17 cyclical shifts made to obtain said valid code word indicates
18 a frame timing for said valid code word.

1 11. The method of Claim 9, wherein said plurality of
2 consecutive symbols comprises a predetermined number of
3 consecutive symbols.

4 12. The method of Claim 9, wherein said predetermined
5 amount comprises one symbol.

1 13. A method for a mobile station to decode an
2 identifying code transmitted from a base station in a CDMA
3 cellular communications system, comprising the steps of:

4 collecting k times M consecutive symbols, said M
5 consecutive symbols comprising said identifying code;

6 calculating a combined likelihood value for said
7 collected k times M consecutive symbols;

8 for each of L code words and each of M cyclic shifts of
9 said collected consecutive symbols, computing a correlation
10 between said k times M collected consecutive symbols and all
11 of M times L consecutive symbols obtained; and

12 storing a code word and number of cyclical shifts made
13 that produced a highest amount of correlation in the
14 computing step.

15 14. The method of Claim 13, wherein said number of
16 cyclical shifts made indicate a frame timing for said
17 identifying code.

18 15. The method of Claim 13, further comprising the step

- 1 of outputting a message associated with said stored code
- 2 word.

1 16. A method for encoding an identifying code to be
2 transmitted from a base station in a CDMA cellular
3 communications system, comprising the steps of:

4 computing a period for each of 2^M words of length M to
5 be encoded as said identifying code;

6 excluding each of said 2^M words that has a period less
7 than M;

8 for each of M cycles of a remainder of said 2^M words,
9 determining a representative word; and

10 storing each said representative word.

11 17. The method of Claim 16, wherein each said stored
12 representative word includes a plurality of code words and
13 no cyclic shift of any one of said plurality of code words
14 produces a valid code word.